

Northwestern College, Iowa

NWCommons

Master's Theses & Capstone Projects

Education

Spring 2021

The Effects of Technology on Student Engagement and Academic Success

Austin Reese

Follow this and additional works at: https://nwcommons.nwciowa.edu/education_masters



Part of the [Educational Technology Commons](#)

The Effects of Technology on Student Engagement and Academic Success

Austin L. Reese

Graduate School of Education, Northwestern College

EDU-635 Capstone

Dr. Theresa Pedersen

April 17, 2020

Table of Contents

Introduction.....	4
Literature Review	
Educational Technology and Literacy.....	6
Educational Technology Use In General Education.....	13
Educational Technology Use In Special Populations.....	16
Educational Technology Use In Student Motivation.....	20
Gaps/Future Research.....	26
Conclusion.....	27
References.....	29

Abstract

The prevalence of educational technology has grown exponentially over the last decade. As schools continually increase use of educational technology throughout the various classroom environments and settings, does educational technology actually increase student engagement and academic success? A multitude of research studies regarding educational technology use in various K-12 classroom settings were analyzed while writing this literature review. The research found various educational technologies and methods, when applied appropriately for differentiated populations, can be a contributing factor to yield increased student engagement and increased academic success.

Keywords: educational technologies, academic achievement, academic success

Introduction

The purpose of this literature review is to identify various technologies and methods that have been used and their contribution to student engagement and academic success in various classroom settings. This paper reviews various research studies conducted on different academic subjects and grade levels within primarily the United States K-12 Education system. Reviewing and identifying which educational technologies and methods of practice have already been studied and what their results have found.

Use of educational technologies has increased exponentially over the past two decades (McClung, 2019). Schools continually choose to use more educational technology, such as one-to-one devices, mobile computer labs and utilization of personal student devices as technological models to enhance student education (McClung, 2019). Various educational technologies have been implemented nationwide with the goal of increasing the effectiveness of student learning and education (Wilkes, 2020). Effectiveness of educational technologies has been researched extensively in elementary through high school classrooms, as well as with special populations and in ELL/ESL settings.

The results of this literature review can be utilized in follow-up studies to further investigate specific educational technologies and their impacts on student engagement and academic success. Educational technologies impacts on students literacy rates, general education, special populations and student motivation are covered in this review. Research conducted on students from diverse learning backgrounds like English Language Learners and 504 students have also been illustrated in the literature below in the special populations section. This review sheds light on student and teacher perspectives and opinions on various educational technologies as well. In order to find the most accurate and up-to-date information and research, these topics

and sources varied primarily from 2014 to 2020. The research used in this literature review was found through the following websites: Northwestern College Dewitt Library, Google Scholar, The Journal of Computer Assisted Learning Science Direct and ProQuest. Utilizing search terms like educational technology, blended learning, educational technology learning and K-12 technological learning allowed diverse research to be found in the area of educational technology in the K-12 setting. Consistent methods are represented in the literature, with the most up-to-date technologies represented. The structure of the literature starts with covering research done on educational technologies impacts on students literacy rates, then its overall impacts in the general education setting, followed by educational technologies use and effects in special population classrooms and finally educational technology and its impacts on students motivation. This review covers various age groups as well as populations that can be found throughout the K-12 education system. In addition this review covers various methods and educational technologies that have been shown to enhance the academic achievement in students from across the K-12 educational system.

Educational technology can be utilized in the K-12 setting to help yield increased student engagement and academic success, though increased performance is not always measured. The review of the literature covers educational technology and its impacts on student literacy rates and proficiency, academic achievement in general education, educational technologies impacts on special populations as well as educational technologies impacts on student motivation.

Literature review

Educational Technology and Literacy

If a student can become a proficient reader by the end of elementary school, future academic success is likely (Wilkes et al., 2020). Kreskey, from the Journal of Contemporary School Psychology, studied kindergarten students and the effects of educational technology intervention strategies in the classroom setting. 1688 kindergarten children were studied in US schools from 91 different classes. Kreskey analyzed schools which utilized the Headsprout program, an online intervention tool intended to help young children with literacy skills. The use of multiple schools throughout several districts, each with similar educational approaches, allowed for uniformity of data (Kreskey & Truscott, 2016). At the end of the year, students were given the DIBELS test in order to track their progress throughout the respective experiments. Kreskey found the Headsprout program had no impact on the literacy skills of the students participating. The kindergarten students who did not participate in Headsprout performed better than those who did (Kreskey & Truscott, 2016). The Headsprout program appeared to have no significant effect on the student literacy rates compared to those who did not participate in the program.

In a separate study, Wilkes researched the impacts of educational technology on literacy growth rates in kindergarten and first grade classes. The six standards of reading were “phonological awareness, phonics, structural analysis, automaticity/fluency, vocabulary, and comprehension” (Wilkes et al., 2020, p.596). In this study, researchers examined the effects of utilizing Core 5 in Kindergarten and first grade classrooms. The Dynamic Indicators of Basic Literacy Skills test (DIBELS) measured student reading skills at the beginning and end of the study. Wilkes' study found students in the treatment schools had high levels of student

engagement and instructional quality (Wilkes et al., 2020). Wilkes analyzed the DIBELS scores for kindergarten and first grade students taken before and after Core 5 implementation. Students utilizing Core 5 technology scored about 20 points higher on their spring DIBELS assessment than students in the control schools (Wilkes et al., 2020). These findings conflict with Kresky's study--the Core 5 program has more of a positive educational impact on young students in need of literacy intervention than the use of the Headsprout model. Wilkes' findings indicate the validity of the Core 5 program, showing its effectiveness to enhance both literacy rates and academic achievement. In addition, Wilkes' study also brings the effectiveness of Headsprout into question, since the Core 5 program was effective in increasing student literacy rates and Headsprout was not.

O'Callahan studied literacy rate improvement through classroom use of the Core 5 program with four- to six-year-old children. The goal of this study was to evaluate the effectiveness of the Lexia Reading, a Core 5 technology, to help improve young children's literacy skills (O'Callaghan et al., 2016). O'Callaghan's study was conducted for 8 weeks, with the goal of enhancing literacy skills like letter sounds, vowels and spelling, as students in treatment schools utilized the technology on an individual level (O'Callaghan et al., 2016). The results of the studies showed Lexia "can be effective in helping reading delayed children... and children with literacy difficulties" (O'Callaghan et al., 2016, p.552). The Lexia computer-based literacy programs were beneficial for nearly two-thirds of students (O'Callaghan et al., 2016). These findings supported Wilkes' study, showing the effectiveness of the Core 5 program to both enhance student literacy rates and contribute to overall academic achievement (Wilkes et al., 2020). Again, the ineffectiveness of the Headsprout program, as examined by Kresky, stands out.

O’Callahan’s study finds the Core 5 program increased student literacy, whereas the Headsprout program did not.

Macaruso conducted a study of blended learning support strategies with Core 5 reading instruction in elementary schools. Macaruso evaluated blended learning through Lexia for students from kindergarten to fifth grade. The Lexia program allowed students to work independently, completing tasks and assignments at their own pace (Macaruso et al., 2020). Macaruso found treatment groups for third to fifth grade students produced significantly higher reading scores than the control group (Macaruso et al., 2020). Macaruso found all groups receiving the Core 5 intervention received higher levels of achievement, but the older elementary students did not experience the same literacy improvements as younger students. In addition, when increasing students' intervention time, the Core 5 program showed continued increases in student literacy improvements and general academic achievement. The findings were found to be significant at all levels throughout elementary. This echoes other findings; the Core 5 program shows benefits in student literacy achievement as well as in increased test scores, which is a measurement of academic achievement (O’Callaghan et al., 2016; Wilkes et al., 2020). Macaruso further indicates educational technologies can help enhance student learning and achievement.

Messer studied the effects of computer assisted learning for English speaking children. The study included 78 children averaging about seven years in age. After ten months, the experimental group had significantly higher standardized testing scores than the control group (Messer & Nash, 2018). This study showed with prolonged use of educational technologies like computer assisted learning, students were able to achieve higher test scores. These findings show educational technology can assist and increase student achievement. This study further supports O’Callahan’s findings: educational technologies have the potential to improve literacy rates and

academic achievement (O'Callaghan et al., 2016; Macaruso et al., 2020). In addition, this study supports Wilkes' assertion; students who utilize educational technologies can see increases in their standardized test scores (Wilkes et al., 2020). Messer's study also indicates the potential error in studies lasting less than ten months, as the intervention time may not be sufficient.

Considering becoming a proficient reader by third grade is a key predictor of future academic career success, Prescott examined the implementation of blended learning programs within literacy instruction across kindergarten through fifth grade at an urban elementary school (Prescott, Bundschuh, Kazakoff, & Macaruso, 2017). Digital technologies were provided to students who needed educational intervention (Prescott et al., 2017). Prescott found English language learners with digital technology access benefited in reading achievement (Prescott et al., 2017). The results were greater in younger students, as opposed to older students (Prescott et al., 2017). These results support the studies conducted by Kresky, Wilkes, O'Callaghan and Messer indicating implementation of educational technologies can have direct impacts on enhancing student literacy rates and academic achievement. Additionally, this study found similar results to Macaruso: older elementary school students, when utilizing educational technologies to enhance academic achievement, do not see the same rates of literacy improvement as younger elementary students (Macaruso et al., 2020). Implementation of educational technology in the elementary school setting does enhance literacy rates and academic achievement at all grade levels, but the degree of improvement has been shown to be higher in younger, rather than older, elementary grades.

Hobbs (2017) studied Utah's Early Intervention Reading software program. He found intervention programs throughout K-3 grades made statistically significant improvements in literacy achievement across all measured grade levels. In addition, Hobbs states achievement of

those who did not use the literacy programs in Utah schools was not as high as those who did (Hobbs, 2017). However, Hobbs did add the reading intervention methods were found to be more effective on kindergarten students, and benefits diminished among the other grade levels (Hobbs, 2017). Hobbs' research supports the findings of previous findings: young elementary school students tend to experience higher levels of achievement than older elementary students when utilizing technology to enhance elementary literacy skills (O'Callaghan et al., 2016; Macaruso et al., 2020; Prescott et al., 2017). Hobbs also supports O'Callahan, Wilkes, and Macaruso, as increased levels of educational technologies in the elementary school classroom and setting can have a direct impact on students' increased levels of literacy and academic achievement.

Most scholars throughout the literature agree classroom implementation of educational technology has generally shown a positive academic outcome in elementary--with the important notation of Headsprout not proving positive results--especially when it comes to literacy skills and reading scores, and especially for the youngest students. While less significant, there are still benefits to technology intervention in later elementary school grades, especially with the integration of the Core 5 program with increased intervention time. Researchers disagree about the amount of time educational technology ought to be utilized in the classroom, as well as which specific models and methods yield the best academic achievement. Mainstream scholars accept literacy rates in students are one of the main indicators for future student success, but the exact methods, timetables and programs for technology in the elementary school classroom are still unknown. Future studies comparing methodology and timetables within each technological educational program could more effectively measure the efficacy of each program on student literacy rates and achievement.

Educational Technology Use In General Education

Utilizing educational technology in the general education classroom has been shown to help contribute to increased student academic achievement (McClung, 2019; Brewster, 2016; Leo & Puzio, 2016). McClung, Arkansas Tech University, examined the impacts of the one-to-one laptop implementation compared to traditional use of technology in the classroom. McClung analyzed opinions of both teachers and students regarding the effects of educational technology on student learning. Specifically, McClung identified academic achievement differences between students in traditional classroom settings and technologically centered learning environments (McClung, 2019). Results from students Aspire Summative Assessments were analyzed to collect data on student achievement levels. The test scores showed students who used one-to-one technology performed higher in all tested subjects compared to those who did not have one-to-one access to technology. However, in some subject areas, improvements were only slightly better than the students who did not receive one-to-one.

Similarly, specific subject areas have also been studied. For example, Brewster examined middle school Social Studies achievement in a blended learning environment. Blended learning is when educators combine online educational materials in the traditional classroom setting. Brewster gathered data regarding student achievement in both 6th and 7th traditional and blended learning classrooms (Brewster, 2016). Brewster analyzed and compared achievement data from both blended learning and traditional 6th and 7th grade classes, and analyzed the data from unit exams from both 6th and 7th grade math and social studies courses (Brewster, 2016). Side-by-side analysis of these studies provides necessary data for school leaders to make decisions regarding use of educational technology (McClung, 2019 & Brewster 2016). In addition, Brewster found students who participated in the blended learning in social studies class

received significantly higher scores than those who did not. Brewster found 6th grade students who participated in blended learning averaged (86%) in the course, compared to the (76%) average of students who did not receive blended learning instruction (Brewster, 2016). Brewster and McClung agree educational technologies can have a positive impact on student grades and academic achievement (McClung, 2019 & Brewster 2016).

Educators recognize the need for differentiated methods of instruction in order to help meet the needs of students in mathematics (Murphy, 2016). In 2013, the United States Department of Education reported approximately only 26% of high school seniors showed strong knowledge of mathematical concepts (Perry & Steck, 2015). Murphy, Liberty University, analyzed a 2015 student in which researchers Perry and Steck investigated the effects of implementing technology into a high school math class. The study utilized iPads as part of a high school geometry course. The primary goals for this study were to explore iPad integration into the geometry classroom in order to increase student engagement. Murphy wanted to see if iPads could improve student engagement and result in higher test scores (Murphy, 2016). Murphy's observations confirmed higher rates of student engagement in iPad classes when compared to the non-iPad group (Murphy, 2016). The findings of this study supported iPad learning and the positive impacts iPads had on student engagement. However, the results from testing showed there was a slightly higher academic outcome with the non-iPad group. In conclusion, the study found utilizing iPads increased student engagement, and motivation to learn and allowed for better teacher-student interactions, but does not find why academic achievement was higher in the group without access to iPad technology (Murphy, 2016). Some of Murphy's study contradicts Brewster, as Brewster found implementing educational technologies like iPads significantly increased student achievement and test scores (Brewster, 2016).

In a similar study, Higgins & BuShell (2017) studied 207 high school students utilizing one-to-one devices in order to identify the effects one-to-one devices can have on student academic achievement and teacher-student relationships. (Higgins & BuShell, 2017). The study found one-to-one models helped build positive relationships and enhanced the teacher's ability to engage students (Higgins & BuShell, 2017). Student surveys indicated one-to-one devices helped build stronger relationships between teachers and students as well as increase student excitement regarding learning. Similarly, Murphy (2016) also found one-to-one devices did help build teacher-student relationships and lead to more communication between teachers and students who were struggling in classes. Unlike Murphy, Higgins and BuShell did not find significant direct contributions to academic achievement through one-to-one device implementation. Higgins and BuShell found the one-to-one devices alone were not a significant factor for increased student academic achievement. Huggins and BuShell examined the importance of teacher use of educational technologies, and argued these findings show the important role educational technology can play in building relationships between teachers and students. Higgins and BuShell found relationships between students and teachers to be a more significant determining factor in student academic achievement, and conclude one-to-one devices can contribute to increased academic achievement, though only by means of improving student-teacher relationships.

A study from Leo and Puzio published in the Journal of Science Education and Technology examined the effectiveness of flipping instructional classrooms in order to increase student academic achievement and motivation in 9th grade biology. The flipped classes utilized educational technologies such as smart boards, iPads, webcam lectures, YouTube videos and Moodle quizzes. Student academic achievement data was taken from student test scores.

Students also received questionnaires in order to identify their perceptions on the learning environments. The results of the study showed students who participated in the flipped classrooms performed better on assessments of scientific knowledge (Leo & Puzio, 2016). In addition to evidence pointing to improved students learning, some students also reported they preferred watching video lectures of class at their own pace (Leo & Puzio, 2016). These findings contradict Murphy's study in which he found iPads did not have a significant role in increasing academic achievement (Murphy, 2016). In addition, Leo and Puzio further support findings from Brewster, Estapa, Nadolny and McClung which indicate iPads and other educational technologies can have significant influences on increasing student achievement (Brewster, 2016, McClung, 2019, Estapa & Nadolny, 2015). Use of various educational technologies in the general educational setting tends to build stronger relationships between students and teachers and enhance student learning.

Educational Technology Use In Special Populations

One of the largest challenges in the classroom is teaching diverse student populations (Akpan & Beard, 2014). Assistive Technology (AT) is at the forefront of all education incentives nationwide (Akpan & Beard, 2014). Instructional assistive technologies can help raise student achievement (Akpan & Beard, 2014). AT can allow opportunities for all students, including English Language Learners, students who are at-risk, and gifted and talented students, to achieve more in the classroom (Akpan & Beard, 2014). For example AT tools help students to gain access to resources, communicate with others, and perform academic tasks independently (Akpan & Beard, 2014). Additionally, assistive technologies can help students with disabilities have the tools to allow them to be successful in the general education setting. Because AT easily

adapts to meet differentiated instructional needs, academic achievement can be improved through AT, specifically in mathematics. (Akpan & Beard, 2014).

AT's ability to improve academic achievement among students in special populations is critical to their success. For example, according to the U.S. Department of Education, students who are English Language Learners (ELL) tend to underperform in reading comprehension and other academic achievement tests (Kazakoff, Macaruso, & Hook, 2017). This study analyzed blended learning strategies and technologies for Elementary English Learning students, specifically analyzing their reading comprehension and proficiency. A total of 884 students ranging in grade levels from Kindergarten to fifth grade, half of whom were classified as ELL, participated in the study. Lexia Reading Core5 program was implemented for one school year for all students in the study (Kazakoff et al., 2017).

Upon completion of the first year, all groups showed significant gains in literacy skills and comprehension. However, neither ELL nor native English speakers in Kindergarten through fifth grade saw any difference in levels of increased academic achievement (Kazakoff et al., 2017). The study continued for another year. In the second year, the study consisted of 71 ELL students and 59 native English speaking students. At the end of the two-year study, more than (80%) of both ELL and non-ELL at-risk students moved up at least one achievement tier (Kazakoff et al., 2017). After two years of Core5 implementation, (80%) of the students who had been previously classified as at-risk of failing their literature achievement goals were elevated beyond the at-risk category. After the two year period, all students in the study showed significant improvements on their standardized reading test (Kazakoff et al., 2017). ELL and native English speaking students improved at the same pace through all grade levels, except for first grade. First grade students who were ELL students showed significantly greater gains than

native English speaking students (Kazakoff et al., 2017). Evidence of improved academic achievement among ELL students who utilized the Lexia Core 5 program indicates continued application of educational technology over extended periods of time can have more significant impact than initial application. During the first year, there was no difference. Gains came during year two, when students were more fluent and acquainted with the Core 5 program. Kazakoff's findings support Kresky, Truscott and Wilkes, as prolonged use of educational technologies showed positive impact on student literacy rates and academic achievement (Wilkes et al., 2020, Kreskey & Truscott, 2016). This study shows that prolonged intervention of the Core 5 program over a two year period yields higher results in student academic achievement compared to intervention over a one year period. This study shows the ability of the Core 5 program to improve student learning and academic achievement over an extended period of time.

Andrei looked at the effects of educational technology for ELL students in the middle school setting. The study looked at how three middle school teachers in English as a Second Language or (ESL) class used technology and what factors influenced their use of devices (Andrei, 2016). The ESL teachers were able to utilize laptops, iPads, video cameras and projectors/digital smart boards. Through the ten week study, the teachers felt comfortable with utilizing technologies in their classes and the technology-based programs had a positive impact on ELL student reading achievement (Andrei, 2016). In addition, Andrei found the technology was a useful tool to help reach student learning goals within a lesson (Andrei, 2016). Andrei's findings focused more on the teachers' abilities and proficiency utilizing educational technology in the ESL classroom. This study is important because it gives insight to teacher perceptions of new educational technology, the specific perspective from the ESL classroom, and how teachers with students from diverse backgrounds can utilize various educational technologies in order to

achieve their desired learning goals. This study supports Kazakoff, as he found various educational technologies can be utilized to help students who are English Language Learners, as well as native English speaking students, achieve their desired learning goals (Kazakoff et al., 2017).

Woodrich and Fan researched the effects of Google Docs when used by ELL students in the middle school setting. The research examined how Google Docs can help encourage student motivation and participation among students with different language backgrounds (Woodrich & Fan, 2017). Research has shown a relationship between student technology use and their sense of comfort and achievement (Woodrich & Fan, 2017). According to Shang, “Students appear to be anxious when writing in class...no matter how many years students have learned English” (Shang, 2013. p.9). Google Docs allows for students to collaborate in shared writing opportunities with their classmates with assistive tools. These tools support ELL students with functions pen and paper do not, such as spelling and grammar checks and tools to help with translation. The researchers used writing activities as well as student and teacher surveys to identify the effect Google Docs had on student motivation and comfort levels when collaborating on writing assignments (Woodrich & Fan, 2017). After students were made familiar with Google Docs, the study ran for three weeks. The study in the 8th grade English class with diverse ELL learners showed online collaborative tools like Google Docs were beneficial in students building their language abilities (Woodrich & Fan, 2017). Building student language skills is a key factor in improved academic achievement. The results of this study showed Google Docs can increase student writing results, and face-to-face use of Google Docs was more effective than virtual use of Google Docs. (Woodrich & Fan, 2017). These findings support Kazakoff’s study, where he

found educational technologies can have a significant impact on student literacy success and help enhance student learning (Kazakoff et al., 2017).

In contrast, a study from Ohio University was conducted on collaborative writing activities and found when using Google Docs, students working virtually performed better than those working face-to-face (Kessler et al., 2012). Though the delivery method had varying effects on overall results, the use of Google Doc technology consistently led to significant academic gains for ELL students, increasing collaborative opportunities and scores on writing projects Kessler et al., 2012). The study found the use of Google Docs allowed the students to score higher on writing assignments than they did before the use of Google Docs into the classroom. The findings support Woodrich and Fan, who found student utilization of Google Docs did enhance ELL student literacy success (Woodrich & Fan, 2017). In addition, Kessler's findings also supported Kazakoff's study, which found educational technologies appear to support both literacy growth in students as well as increase academic achievement (Kazakoff et al., 2017).

DiCicco looked at the effects of Google technologies, specifically the effectiveness of Google Classroom for students with disabilities. Google Classrooms is an online learning platform which allows for the use of various Google tools and technologies to be utilized in the same virtual classroom. The purpose of this study was to analyze learning outcomes and the effects of Google classroom in a social studies classroom for students with disabilities (DiCicco, 2016). DiCicco utilized a pre-test based on their textbooks and then randomly assigned students to two groups of 15. The experimental group was given three weeks of intensive direct instruction during which they utilized Google Classroom, Google Docs, Google Forms, Google Slides and G-Mail. The control group learned directly from the textbook in a separate room

(DiCicco, 2016). At the end of the three week period, both groups were given a test based on the textbook to evaluate their performance. The results of the test showed students in the experimental group averaged 7 to 9 points higher on the test than those who learned entirely and directly from the textbook (DiCicco, 2016). The results from the test show the importance of both direct instruction in the classroom as well as the importance of available technologies to enhance student learning. Students in the experimental group were also surveyed in order to gather their perceptions of their learning experience while utilizing Google classroom. Through the student surveys, 11 out of the 15 students agreed that Google Classroom was overall likeable, easy to use and increased their presence when learning (DiCicco, 2016). These results from student surveys support findings from Woodrich and Fan's study, which found utilizing Google educational technologies had a positive effect on student motivation and overall perception of their classes (Woodrich & Fan, 2017).

Academic results from the study also showed a positive relationship between Google Classroom use and increased standardized test scores as well as increased academic achievement. For example, the entire class's vocabulary scores rose from an average of 85.34 to 91.76 after two weeks of intervention (DiCicco, 2016) Google classroom and other educational technologies allowed for students to utilize review games like Quizlet and Kahoot. These new resources appear to have enhanced student ability to review key concepts, directly influencing their increased achievement rates (DiCicco, 2016) This study showed the positive impacts Google classroom and other Google educational technologies can have on students. These findings also support Woodrich and Fan's study, which found Google Docs did have an impact on student literacy, writing and overall academic achievement (Woodrich & Fan, 2017). In

addition, DiCicco supports Kazakoff's study, as various educational technologies can be used to enhance students' learning and overall academic achievement. (Kazakoff et al., 2017).

Educational Technology Use In Student Motivation

The proper implementation of educational technologies is critical to student success, as “technology also affects student motivation to learn” (Al-Bataineh, M. & Al-Bataineh, A. 2016; Harris et al., 2016, p.368). Since the implementation of the No Child Left Behind Act, schools have worked to eliminate the digital divide and have students technologically literate by the end of the eighth grade (Harris, Al-Bataineh, M. & Al-Bataineh, A. 2016).

Harris (2016) researched 4th grade participants to determine if one-to-one (1:1) technology had an impact on student motivation. After a year of 1:1 laptop implementation, 4th grade students were surveyed (Harris et al., 2016). The results of the survey showed participants with 1:1 devices in schools felt more motivated to learn (Harris et al., 2016). In addition to increased motivation, researchers found the new 1:1 devices could have played a role in student academic achievements (Harris et al., 2016). At the beginning of the year, students who had devices scored an average of (82.58%) on standardized topic tests, and students who did not have devices scored an average of (65.87%) (Harris et al., 2016). Student excitement and eagerness to use new technology could have contributed to higher test scores (Harris et al., 2016). Another test was given toward the end of the school year, and the test results showed students who had the 1:1 laptops all year scored an average of (78.26%), compared to students who did not have access to the 1:1 technologies, who scored an average of (68.16%) (Harris et al., 2016). In the study, initial increased motivation in certain students was credited to student access to 1:1 devices. This implementation of new educational technologies initially had a drastic impact on student motivation and academic achievement. As students became more acquainted with the

devices, student excitement leveled out. However, even though excitement was not as significant by the end of the school year, data indicates both student motivation and academic achievement were both positively influenced by the implementation of 1:1 devices into the classroom.

Francis conducted a study of an urban New England charter school. Francis integrated WebQuest, an online learning platform where lessons and information comes from the internet (Francis, 2017). Through educational technology in the classroom setting, students completed surveys which gauged their motivation and perception of WebQuest in their classes (Francis, 2017). The 4th and 5th grade students who used WebQuest described an increase in their excitement and motivation to work and learn (Francis, 2017). Francis (2017) also found the majority of students in the 4th and 5th grade classes (73 out of 95) felt technology motivated them. These findings indicate educational technology in classrooms can motivate students to participate and excel in the classroom setting. This study supports Jennifer Harris's findings; students who have access to technological technologies have increased motivation in the classroom (Harris et al., 2016).

Another study from the Journal of Educational Technology, Research and Development looked at iPad mobile devices in the 6th and 7th grade mathematics classes (Fabian, Topping, & Barron, 2018). Researchers wanted to identify student motivation and perception of technologies into the classroom environment. Students utilized iPads to participate in collaborative activities for three months. Researchers interviewed students and found that (80%) of students had a positive overall perception of the activities (Fabian et al., 2018). The results of the study showed students in the experimental groups were more engaged and perceived math as more enjoyable than the control group (Fabian et al., 2018). This study supports both Francis' and Harris' studies in which Educational Technologies and 1:1 devices were found to have a significant impact on

both student motivation and academic success (Harris et al., 2016 & Francis, 2017).

These studies show educational technologies as well as blended learning methods can increase student achievement and engagement. Research suggests educational technologies tend to enhance student perception of class and increase student enjoyment within specific topics. Improved student achievement is influenced by student outlook on school as a whole. It has been found that when technology-based learning is applied to students they begin to see the intrinsic value of what is being learned, which increases interest and motivation by the student (Francis, 2017). The increased enjoyment students have in class creates more of a positive relationship between students and their classes, and when students enjoy their classes, they perform at a higher level. They become more motivated in school, and a more motivated learner turns into a learner with greater achievements.

Successful academic experiences include student confidence and motivation as students invest and take ownership of their education (McElhany, 2017). Students must be empowered to take responsibility within their education and feel confident they have the skills and knowledge necessary to do so (McElhany, 2017). Literature has shown students who participate in technologically rich learning classroom environments and models enjoy those activities and structures (Estapa & Nadolny, 2015). According to Estapa and Nadolny (2015), students who used educational technology while learning found the work both more challenging and more enjoyable. This is important because when students are challenged, they can be motivated to achieve more. Students also described learning with technology as something they “liked,” with which they “learned,” and something they found “fun and cool” (Estapa & Nadolny, 2015, p.45). The students who enjoyed learning with educational technologies were motivated to achieve more. Technologies in the classroom allow for increased student efficacy and self-direction, in

addition to allowing students to submit assignments online and potentially receive teacher feedback faster (Varier et al., 2017). When a student has the opportunity to finish work during their free time and become more self-regulated, student achievement levels often increase (Mega, Lucia & Rossana, 2014). Students utilizing educational technology also feel more flexibility to complete work during free time at school, allowing for deeper levels of engagement (Varier et al., 2017). Increased student motivation and independence through the use of educational technology can allow students to take an ownership role in their education, and also can allow teachers to better differentiate teaching strategies and instruction.

Another study from Iowa State University was conducted using Augmented Reality (AR) with the purpose of assessing student achievement and motivation during a high school math class. This study analyzed 61 students within one high school in rural Iowa. Group One received a print handout and a device with access to the print handout, with augmented reality enhancements via the mobile device (Estapa & Nadolny, 2015). The second group received the same print handout and a device, but the device only had access to digital resources, linking to the handout webpage (Estapa & Nadolny, 2015). The study collected data from pre-test, post-test and delayed post-test, each consisting of ten questions focused on assessing students' conceptual understanding of the content (Estapa & Nadolny, 2015). Student motivation was also measured using an Instructional Material Motivational Survey (IMMS). Students were asked about their attention, relevance, confidence and satisfaction with the new devices (Estapa & Nadolny, 2015).

The results from the study indicated the activity of utilizing technology into the classroom increased students' conceptual understanding of the content (Estapa & Nadolny, 2015), which directly contradicted the results of the Erbas and Demiers study. In addition, Estapa and Nadolny also found students were clearly motivated by the activity both in the AR and

website various groups, indicating AR and the use of educational technology has a positive influence on student motivation in schools (Estapa & Nadolny, 2015). Studies showed AR captured student attention more than the website alone (Estapa & Nadolny, 2015). Estapa and Nabolny added the support of prior research, which showed the use of AR in classroom context can increase motivation (Estapa & Nadolny, 2015). Increased student motivation can enhance student learning and achievement (Estapa & Nadolny, 2015; Francis, 2017).

Student academic achievement and motivation were also studied by Erbas, who conducted a study in the UK, investigating the effects of augmented reality (AR) activities in a biology course (Erbaş & Demirel, 2019). Each class (A, B, and C) included a mix of students with high, medium and low levels of achievement (Erbaş & Demirel, 2019). The research to determine the effects of AR activities on student academic achievement developed into two stages: the first stage was a question pool created by both the researchers and the biology teacher. The questions consisted of 36 questions from the ninth-grade biology curriculum (Erbaş & Demirel, 2019). The second stage identified possible sources of student motivation through questionnaires, interviews and classroom observations (Erbaş & Demirel, 2019). The study found AR did not make a significant difference in academic achievement (Erbaş & Demirel, 2019). However, student surveys indicated the use of AR positively affected both motivation and student opinion of biology and the course (Erbaş & Demirel, 2019). This research was not able to find increased academic achievement through this teacher's use of AR, but it did track student motivation to learn in the biology setting. This study supports findings from Francis in which students enjoyed technologically rich classrooms opposed to traditional classroom teaching and environments (Francis, 2017). In contrast, Erbas' study contradicted the findings of Harris, which found use of educational technologies increased motivation, increased student scores and

academic achievement (Harris et al., 2016). Although Ebras' study did find increased student motivation through educational technology implementation, the technology was not shown to be a significant factor in increasing academic achievement. Given a longer timeline, there is a chance this increased student motivation could contribute to increased academic attentiveness, excitement, and thus achievement in the classroom, as is evidenced in studies taking place over a more substantial period of time (Kazakoff et al., 2017). Ebras did not prove or disprove the theory that increased motivation increases academic achievement, unlike most of the other studies. The literature shows educational technologies can have a positive, direct influence on student motivation in schools. In turn, increased student motivation can directly influence increased academic achievement.

Future Research

First, Brewster admits there is a lack of research surrounding the effectiveness of various blended learning models in middle school (Brewster, 2016, p.18). The lack of research in the middle school setting shows a gap and a need for further research on various methods in middle schools. This further research would continue to solidify his finding for increased academic achievement with methods in the secondary setting.

More significantly, many studies indicate increased motivation and academic performance with the use of technology in the classroom, but some do not. Future research is needed to investigate why academic success is increased with educational technology use in some settings, and not in others. Perhaps a team could compare educational applications and methods of implementation, or study which teaching methods are best paired with educational technology. Widespread use of technology used to improve classroom management (i.e. ClassDogo, Bloomz, Seesaw) has not yet been widely studied. Finally, research considering time

-on-task using technology and academic achievement could significantly change hybrid educational initiatives. Gaps in the research leave teachers with insufficient information.

Conclusion

Students who have access and utilize educational technologies have been found to have increased academic achievement rates, compared to students who do not utilize educational technologies (Daehlen 2017). The literature shows educational technology into the classroom, in many circumstances, does improve student motivation levels as well (Francis, 2017). Educational technologies allow students to have fun and choice within their education, contributing to increased motivation and ownership in their education (McElhany, 2017). Along with increased motivation, students in technology centered classroom environments also enjoyed their schoolwork and classes more than those who did not receive technology (Estapa & Nadolny, 2015). In addition, it has been found throughout the literature in this review, various educational technologies have a positive impact on student's academic achievement. When students enjoy their classes and have the opportunity to access and complete their work using technology, continuous engagement is possible. When students are more engaged, they are more likely to complete their work, contributing to their overall academic achievement.

References

- Akpan, J. P., & Beard, L. A. (2013, November 30). *Assistive technology and mathematics education, universal journal of educational research, 2014*. Eric.
<https://eric.ed.gov/?id=EJ1053963>
- Andrei, E. (2016). Technology in teaching english language learners: The case of three middle school teachers. *TESOL Journal*, 8(2), 409–431.
<https://doi.org/10.1002/tesj.280>
- Brewster, B. (2016). *Examining U.S. middle school students' achievement in a blended learning environment* | *semantic scholar*. Semantic Scholar.
<https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=3328&context=dissertations&httpsredir=1&referer=>
- Daehlen, M. (2017). Completion in vocational and academic upper secondary school: The importance of school motivation, self-efficacy, and individual characteristics. *European Journal of Education*, 52(3), 336–347. <https://onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1111/ejed.12223>
- DiCicco, K. M. (2016). *The effects of google classroom on teaching social studies for students with learning disabilities*. Rowan Digital Works.
<https://rdw.rowan.edu/etd/1583/>
- Erbas, C., & Demirer, V. (2019). The effects of augmented reality on students' academic achievement and motivation in a biology course. *Journal of Computer Assisted*

- Learning*, 35(3), 450–458. <https://onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1111/jcal.12350>
- Estapa, A., & Nadolny, L. (2015, September 15). *The effect of an augmented reality enhanced mathematics lesson on student achievement and motivation*. Learning & Technology Library (LearnTechLib). <https://www.learntechlib.org/p/151963/>
- Fabian, K., Topping, K. J., & Barron, I. G. (2018). Using mobile technologies for mathematics: effects on student attitudes and achievement. *Educational Technology Research and Development*, 66(5), 1119–1139. <https://doi.org/10.1007/s11423-018-9580-3>
- Francis, J. (2017). *The effects of technology on student motivation and engagement in Classroom-Based learning*. DUNE: DigitalUNE. <https://dune.une.edu/theses/121/>
- Harris, J. L., Al-Bataineh, A., & Al-Bataineh, M. T. (2016, November 30). *One to one technology and its effect on student academic achievement and motivation, contemporary educational technology, 2016*. Eric. <https://eric.ed.gov/?id=EJ1117604>
- Higgins, K., & BuShell, S. (2017). The effects on the student-teacher relationship in a one-to-one technology classroom. *Education and Information Technologies*, 23(3), 1069–1089. <https://doi.org/10.1007/s10639-017-9648-4>
- Hobbs, J. (2017). *Utah's early intervention reading software program 2016-2017 k-3 program evaluation results*. Imagine Learning. <https://www.imaginelearning.com/sites/institutional/files/2017->

[12/Utah%20Early%20Intervention%20Reading%20Software%20Program%202016-2017%20K-3%20Program%20Evaluatino%20Results.pdf](https://doi.org/10.1007/s11423-017-9565-7)

Kazakoff, E. R., Macaruso, P., & Hook, P. (2017). Efficacy of a blended learning approach to elementary school reading instruction for students who are English Learners. *Educational Technology Research and Development*, 66(2), 429–449. <https://doi.org/10.1007/s11423-017-9565-7>

Kessler, G., Bikowski, D., & Boggs, J. (2012). Collaborative writing among second language learners in academic web-based projects. *Language Learning & Technology*, 16(1), 91–109. https://scholarspace.manoa.hawaii.edu/bitstream/10125/44276/1/16_01_kesslerbikowskiboggs.pdf

Kreskey, D. D. V., & Truscott, S. D. (2015). Is Computer-Aided instruction an effective Tier-One intervention for kindergarten students at risk for reading failure in an applied setting? *Contemporary School Psychology*, 20(2), 142–151. <https://www-proquest-com.ezproxy.nwciowa.edu/docview/1992199717?accountid=28306>

Kutsyruba, B., Klinger, D. A., & Hussain, A. (2015). Relationships among school climate, school safety, and student achievement and well-being: A review of the literature. *Review of Education*, 3(2), 103–135. <https://bera-journals-onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1002/rev3.3043>

Lai, J. W. M., & Bower, M. (2019). Evaluation of technology use in education: Findings from a critical analysis of systematic literature reviews. *Journal of Computer*

Assisted Learning, 36(3), 241–259. <https://onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1111/jcal.12412>

Leo, J., & Puzio, K. (2016). Flipped instruction in a high school science classroom. *Journal of Science Education and Technology*, 25(5), 775–781. <https://www-proquest-com.ezproxy.nwciowa.edu/docview/2259589357?accountid=28306>

Macaruso, P., Wilkes, S., & Prescott, J. E. (2020). An investigation of blended learning to support reading instruction in elementary schools. *Educational Technology Research and Development*, 68(6), 2839–2852. <https://doi.org/10.1007/s11423-020-09785-2>

McClung, J. K. (2019). *Examining the relationship between One-to-One technology and student achievement*. Online Research Commons @ ATU. https://orc.library.atu.edu/etds_2019/7/

McElhany, J. (2017). AWAKENING student ownership: TRANSITIONING to a Student-Centered environment. *Reston*, 70(1), 29–35. <https://www-proquest-com.ezproxy.nwciowa.edu/docview/1889708837/fulltext/7240C7453C3C43CFPQ/1?accountid=28306>

Mega, C., Ronconi, L., & De Beni, R. (2014). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology*, 106(1), 121–131. <https://www-proquest-com.ezproxy.nwciowa.edu/docview/1381032423?accountid=28306>

- Messer, D., & Nash, G. (2018). An evaluation of the effectiveness of a computer-assisted reading intervention. *Journal of Research in Reading, 41*(1), 140–158.
<https://onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1111/1467-9817.12107>
- Murphy, D. (2016). A literature review: The effect of implementing technology in a high school mathematics classroom. *International Journal of Research in Education and Science, 2*(2), 295–298. <https://files.eric.ed.gov/fulltext/EJ1105104.pdf>
- O’Callaghan, P., McIvor, A., McVeigh, C., & Rushe, T. (2016). A randomized controlled trial of an early-intervention, computer-based literacy program to boost phonological skills in 4- to 6-year-old children. *British Journal of Educational Psychology, 86*(4), 546–558. <https://bpspsychub-onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1111/bjep.12122>
- Perry, D. R., & Steck, A. K. (2015). Increasing student engagement, Self-Efficacy, and Meta-Cognitive Self-Regulation in the high school geometry classroom: Do iPads help? *Computers in the Schools, 32*(2), 122–143.
<https://doi.org/10.1080/07380569.2015.1036650>
- Prescott, J. E., Bundschuh, K., Kazakoff, E. R., & Macaruso, P. (2017). Elementary school-wide implementation of a blended learning program for reading intervention. *The Journal of Educational Research, 111*(4), 497–506.
<https://doi.org/10.1080/00220671.2017.1302914>

- Schechter, R., Macaruso, P., Kazakoff, E. R., & Brooke, E. (2015). Exploration of a Blended Learning Approach to Reading Instruction for Low SES Students in Early Elementary Grades. *Computers in the Schools*, 32(3–4), 183–200.
<https://doi.org/10.1080/07380569.2015.1100652>
- Shang, H.-F. (2013, September 24). *Factors associated with english as a foreign language university students' writing anxiety*. EA Journals.
<https://www.eajournals.org/journals/international-journal-of-english-language-teaching-ijelt/vol-1-issue-1-september-2013/factors-associated-with-english-as-a-foreign-language-university-students-writing-anxiety/>
- Shelley-Trembley, J., & Eyer, J. (2009). Effects of the reading plus program on reading skills in second graders. *Journal of Behavioral Optometry*, 20(3), 59–66.
https://www.researchgate.net/publication/260036197_Effect_of_the_Reading_Plus_Program_on_Reading_Skills_in_Second_Graders
- Varier, D., Dumke, E. K., Abrams, L. M., Conklin, S. B., Barnes, J. S., & Hoover, N. R. (2017). Potential of one-to-one technologies in the classroom: teachers and students weigh in. *Educational Technology Research and Development*, 65(4), 967–992. <https://www-proquest-com.ezproxy.nwciowa.edu/docview/1918797212?accountid=28306>
- Wilkes, S., Kazakoff, E. R., Prescott, J. E., Bundschuh, K., Hook, P. E., Wolf, R., Hurwitz, L. B., & Macaruso, P. (2020). Measuring the impact of a blended learning model on early literacy growth. *Journal of Computer Assisted Learning*, 36(5), 595–609. <https://doi.org/10.1111/jcal.12429>

Woodrich, M., & Fan, Y. (2017). Google Docs as a Tool for Collaborative Writing in the Middle School Classroom. *Journal of Information Technology Education: Research*, 16, 391–410. <https://doi.org/10.28945/3870>

Xu, Z., Wijekumar, K. K., Ramirez, G., Hu, X., & Irey, R. (2019). The effectiveness of intelligent tutoring systems on K-12 students' reading comprehension: A meta-analysis. *British Journal of Educational Technology*, 50(6), 3119–3137. <https://bera-journals-onlinelibrary-wiley-com.ezproxy.nwciowa.edu/doi/pdfdirect/10.1111/bjet.12758>